(20 m.), by C. D. Child. A Righi vibrator and a tinfoil receiver were used to study the diffraction of electric waves by a tinfoil grating. The apparatus worked quite well and the resulting wave-length determinations were satisfactory.

24. *The Effect of Age upon the Molecular Structure of Bronze, Glass and Steel* (10 m.), by Wm. A. Rogers. As a result of comparisons extending over a period of five years, the author concludes that our fear as to the molecular changes of length of our standards is not well founded.

25. *A New Determination of the Relative Length of the Yard and Metre* (8 m.), by William A. Rogers. A new determination gives the metre as equal to 39.37015 inches, slightly different from the accepted international value, 39.3700, which, however, is being reviewed by the Bureau which may confirm the author's value.

The following papers were read by title:

26. *California Electric Storms* (20 m.), by John D. Parker.

27. *A New Formulation of the Second Law of Thermodynamics*, by L. A. Bauer.

28. *The Method of Reciprocal Points in the Graphical Treatment of Alternating Currents*, by Frederick Bedell.

It will be seen that the papers were of unusual interest, and they provoked much careful discussion. The attendance was large, ranging from 40 to 60, and the number of specialists present was remarkable.

A motion by William Orr, Jr., of Springfield, resulted in the appointment by the Council of the following committee to consider standard colors and color nomenclature; O. N. Rood, chairman; W. Le Conte Stevens and W. Hallock. Similarly a motion by H. S. Carhart, of Ann Arbor, resulted in the appointment of a committee upon electrical and other standards, consisting of T. C. Mendenhall, chairman; William A. Rogers, H. A. Rowland, H. S. Carhart, E. L. Nichols and R. S. Woodward, with power to add a seventh.

William Hallock.

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SECTION C. CHEMISTRY.*

The address of the Vice-President of the Section, Dr. William McMurtrie, of Brooklyn, has been already printed in Science, September 6th. Owing largely to the efforts of the Vice-President and of others under his direction in preparing for the meeting, the attendance at the sessions of the Section was large and the papers presented were of more than usual interest.

FRIDAY MORNING, AUGUST 30.

The first paper was by Professor W. P. Mason, of Troy, N. Y., 8 on 'Foreign Laboratory Notes.' He spoke of recent experiments in Paris showing the effect of the liver in stopping poisons in the organism; also that it has been shown that urea is not toxic in action. Diagrams were distributed showing the way in which the number of deaths of children corresponds to the percentage of samples of bad milk found by the public analysts.

New methods used in Paris for the examination of potable waters were spoken of and Miquel's theory of the auto-contamination of waters was refered to.

Mrs. Ellen H. Richards and J. W. Ellms, of the Massachusetts Institute of Technology, read a paper on 'The Coloring Matter of Natural Waters, its Source, Composition and Quantitative Measurement.' The colors appear to be formed by the partial carbonization of organic matter. A series of natural waters furnishes the best secondary standard. Such standards fade and must be replaced at least once in six months. The tintometer is very satisfactory for making the comparison. The colors obtained

* Reported by W. A. Noyes, A. H. Gill and Francis C. Phillips.

by treating steel with nitric acid appear to furnish the best primary standards.

Professor W. D. Bancroft, of Newport, R. I., spoke on 'Saturated Solutions and the Mass Law.' The author showed that the precipitation of salts from saturated aqueous solutions by organic liquids and by other salts can be expressed by the formulæ

$$(X+A)^n y=c$$

and $(X+A)^n (y+B) =c$, in which X is the quantity of the salt in the saturated solution and y the quantity of the added liquid or salt. A and B are calculated from the experiments themselves and the formula may be derived by an application of the law of mass action.

Professor F. P. Venable, of Chapel Hill, N. C., discussed 'Recent Views on the Periodic System,' giving a very brief historical review and referring more in detail to the views of Preyer, Thomsen and Boisbaudran.

Thomsen's table is the same as that of Carnelley, the latter having stated that it was originally Bayley's. Professor Venable has given a table himself in the Journal of the American Chemical Society, but disclaims any attempt to discuss the genesis of the elements. The law is incomplete, but establishes that the elements are not independent bodies but are closely related to each other. He also described a synoptical table of the elements by Professor L. R. Gibbs, of Charleston, S. C., published in 1875, which contained many of the features of Mendeleef's system, though developed without knowledge of that. It also anticipated much of the later work.

FRIDAY AFTERNOON.

Dr. H. N. Stokes, of Washington, gave an account of the work which has been done with argon and helium.

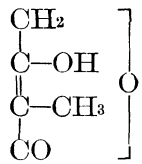
Prof. E. W. Morley, of Cleveland, Ohio, gave an account of his determinations of the volumetric composition of water. The ratio obtained by Professor Morley some years ago, while undoubtedly the same which any other observer working with apparatus of the same nature and dimensions and with the same care, would obtain, was incorrect because of some physical reason, dependent on the measurement of gases in tubes, but not clearly understood. By a different method, the ratio has been determined with very great accuracy as being 2.00269. This value agrees closely with that obtained by Scott in his later work, and also fairly well with the result calculated by the formula of Van der Waals. The densities of hydrogen and of oxygen have also been determined by methods which eliminate the effect of mercurial vapor. The values are, for a latitude of 45°, 0.089873 for hydrogen and 1.42900 for oxygen.

Prof. C. H. Herty, of Athens, Ga., spoke of 'Double Salts and Allied Compounds.' Attention was called to the inaccuracy of past work, the various lines of investigation followed, and the theoretical views of the constitution of these bodies which have been advanced by Horstmann, Remsen, Werner, Carnegie and others. None of these seem to be entirely satisfactory. Lines of work were suggested which may prove useful in determining the constitution of these bodies.

Prof. W. A. Noyes, of Terre Haute, Ind., read a paper on 'Camphoric Acid.' A new and independent proof that cis-campholytic acid is a $\Delta'$ compound has been obtained. A study of hexahydro-xylyllic and some of its derivatives has given quite conclusive proof that the Armstrong-Wallach formula for camphoric acid is incorrect.

FRIDAY EVENING.

Prof. P. C. Freer, of Ann Arbor, described his recent work on 'Tetrinic Acid.' This indicates that the correct formula for the acid is



Prof. A. B. Prescott, of Ann Arbor, gave an account of work on periodides. A classification and theoretical discussion of the character of periodides was given and was followed by a description of the following periodides:

A. Pyridine Alkyl periodide.

1. Pyridine methyl pentaiodide.
2. " " diiodide.
3. " " triiodide.
4. " " tetraiodide.
5. " " octoiodide.
6. " ethyl triiodide.

B. Periodides of the amine and of the tertiary ammonium base.

1. Pyridine tetraiodide.
2. " hydrogen pentaiodide (Dafert).

C. Dipyridine trimethylene dibromide.

Whenever a mixture of alkyl iodide and iodine is added to pyridine, there will be some formation of the periodide of the amine base as well as of the pyridine alkyl periodide. Mr. R. F. Flintermann and Mr. B. F. Trowbridge have done most of the experimental work described.

MONDAY MORNING, SEPTEMBER 2.

Prof. C. L. Jackson, of Cambridge, read a paper on 'Some New Color Reactions.' On adding sodium ethylate to brom-di-nitrotoluene and other similar bodies, unstable compounds having brilliant colors were formed. V. Meyer has made similar observations and the work will not be continued, but results obtained indicate that the nitro group is directly affected in the formation of these bodies.

Prof. Jackson read a second paper on 'Picryl Malonic Ester.' Two forms melting at 58° and at 64° have been obtained. The former was obtained at first, but repeated attempts to prepare it a second time were unsuccessful.

A discussion on 'The Teaching of Organic Preparations' followed. Prof. P. C. Freer, of Ann Arbor, introduced the subject. He advocated the selection of some classical research which is to be carefully studied and the experimental work repeated by the student. The discussion was continued by C. L. Jackson, T. H. Norton, W. A. Noyes, A. B. Prescott, W. H. Seaman and L. W. Andrews.

Prof. A. B. Prescott gave an introduction to the subject, 'Inherent Limitations in the Accuracy of Analytical Work.' An abstract of a paper by A. A. Blair and J. E. Whitfield on 'Ammonium Phosphomolybdate,' and the reducing action of zinc in the reductor, was given. Prof. E. D. Campbell gave a provisional schedule of admissible limits of accuracy in certain metallurgical analyses. An abstract of a paper by F. P. Dewey on 'Accuracy in Metallurgical Analysis' was given by Prof. Prescott. In these papers an attempt was made to make a beginning toward the establishment of standards of accuracy which may be demanded of chemists in various forms of analytical work. The papers were discussed by W. O. Atwater, L. F. Kebler, J. L. Howe, William McMurtrie and others.

Prof. T. H. Norton, of Cincinnati, illustrated the use of thioacetic acid as a laboratory reagent. Methods of preparation were also discussed; in the discussion the odor of the thioacetic acid was unfavorably noticed.

MONDAY AFTERNOON, SEPTEMBER 2.

Prof. T. H. Norton spoke of the phosphorus contained in phospho-cereal. Of about five per cent. of $P_2O_5$ present, about one-half passes into solution on boiling with water for two hours.

Prof. R. B. Warder, of Washington, read

a paper on the Major Premise in Physical Chemistry. The tendency of chemical progress is to place more emphasis on physical methods and the mathematical deductions of thermodynamics. The aid of physicists and mathematicians would be desirable in obtaining rational instead of empirical formulas.

Prof. C. L. Jackson, of Cambridge, gave an interesting account of the order which he follows in instruction in general chemistry.

Prof. T. H. Norton spoke of laboratory construction and equipment.

Prof. J. L. Howe, of Lexington, Va., spoke of the relative order of theory and description in the teaching in general chemistry. For college students a course of instruction in which theoretical considerations appear early and are used constantly in the development of the work was advocated. The paper was discussed by P. C. Freer, T. H. Norton and C. H. Herty.

A paper by H. W. Wiley, of Washington, on quantitative experiments in general chemistry was read.

A paper by Prof. G. C. Caldwell, of Ithaca, on instruction in quantitative analysis, was also read.

TUESDAY MORNING, SEPTEMBER 3.

Prof. Norton read a paper by Dr. H. C. Bolton, of New York, on 'Bibliography as a Feature of the Chemical Curriculum.' The author urged that more bibliographic work should be done in our colleges and universities. Prof. W. A. Noyes spoke of the preparation of papers on special topics by students and of journal reviews. The topic was discussed by H. P. Talbot and W. O. Atwater. A paper by P. T. Austen on 'Chemistry as a Liberal Education' was omitted, in the absence of the author, for lack of time. Dr. E. E. Smith, of New York, read a paper on 'A Specific Form of Cell Metabolism.' The paper described the composition of the cell and relation of chemical composition to the structural elements. Reference was then made to the decomposition products of the nucleins and the relation of these to uric acid brought out. It was then explained why uric acid excretion, when the ratio to the amount of urea is considered, becomes an index to the existence of nutritional disturbances, particularly of a class whose symptoms are largely subjective. A paper by E. A. de Schweinitz upon 'Products of Pathogenic Bacteria' was read by title, as Dr. de Schweinitz was unable to be present.

The paper of Prof. W. O. Atwater, upon 'Some Points connected with the Chemistry and Physics of Metabolism,' was not read, but was summarized by him as follows: The physiologist must either become a chemist or turn over the products of his work to a chemist for examination. Experimentation must be based upon income and outgo of matter in the body in terms of energy. This has only been done recently, as the apparatus has been wanting.

A new field for the chemist is thus opened up which is fully as important as any other. The value of the basal calorimeter for the determination of the heating value of foods was spoken of. Discussion was participated in by Prof. A. B. Prescott.

'Record of Progress in Agricultural Chemistry,' by H. W. Wiley, was read by title by Prof. Atwater.

The author dwelled upon the recent advances in agricultural science and the increased facilities which have been provided for its study at the larger colleges and universities.

One of the chief difficulties encountered by agricultural chemists has been found in the selection of accurate methods for the analysis of the constituents of plants, and certain classes of these constituents are as yet little understood. Great progress is being made, however, in their investigation.

Recent investigations have clearly shown that atmospheric nitrogen plays an important part in the nutrition of plants. The assimilation of nitrogen from the atmosphere can only result from the activity of a microbe which is present in the soil. Fertility of the soil is, in case of certain plants, largely dependent upon the existence of this bacterium. It is probable that a study of the part played by the bacteria in the soil will prove of great importance. The results already obtained in introducing bacteria into the soil have been most encouraging in the case of certain plants.

The paper was discussed by Profs. G. E. Patrick, J. L. Howe and W. O. Atwater. Prof. Atwater described the experiments which are being conducted in this country and abroad to determine comparative values of foods and the quantities of food required by people of different classes and occupations.

A paper by Prof. Milton Whitney, on 'Recent Progress in the Analysis of Soils,' was omitted owing to the absence of the author. Mr. J. T. Morehead read a paper on 'Calcium Carbide.' The author described the process of manufacture in an electric furnace. The furnace is constructed of ordinary brick and is covered. Vertically supported carbon rods, 4 inches thick, constitute the positive electrode. A plate of iron at the bottom of the furnace, covered by a layer of carbon, forms the negative electrode. The charge consists of a mixture of ground lime and coke.

A current of 100 volts and 1700 amperes produces 80 pounds per hour of calcium carbide. The product is a hard crystalline substance having the composition $Ca\ C_2$. Immersed in water it is decomposed with violence but with very little heat, and yielding slacked lime almost white in color. Five cubic feet of acetylene gas are produced by one pound of carbide. Large quantities of the carbide are now being manufactured by the Wilson Aluminum Company in their works situated at Spray, N. C. After a tribute of thanks to Dr. Wm. McMurtrie, Vice-President of the Section of Chemistry, the Section adjourned.

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SECTION D. MECHANICAL SCIENCE AND ENGINEERING.

The chairman of Section D, William Kent, of Passaic, N. J., and the secretary, Professor Henry S. Jacoby, of Ithaca, N. Y., were both present throughout the meeting of the Association. The Vice-President's address, which is published on page 321 of Science, was delivered on Thursday afternoon, August 29th, and excited more than usual interest outside as well as in the Section by its able exposition of the work of the engineer as related to economic progress.

The papers were read on Friday. That of H. N. Ogden, of Ithaca, N. Y., treated of the 'Economics of Engineering Public Works.' After an introduction referring to the extravagance of the American people, and to the influences which favored individual action and rendered unnecessary the combination of interests by coöperation until recently, instances were given of corporations seeking advantage at the expense of the public good. The tearing-up of city streets, and digging one trench for gas pipes, another for water pipes, and others for sewers and steam pipes, without any mutual arrangement, was given as an illustration of the most common lack of economy in municipal affairs, as the people ultimately pay for all the trenches and suffer the loss incident to breaking up the streets so frequently, interfering with traffic and often ruining the paving. Similar extravagance is seen in the conduct of elections and the assessment and collection of taxes. Numerous instances of the ability of our people to adapt means to ends, to devise new methods to changed conditions, give hope